**Sample Question Paper**
**Class- X Session- 2021-22**
**TERM 1**
**Subject- Mathematics (Basic)**

**Time Allowed: 90 minutes** **Maximum Marks: 40**

**General Instructions:**

**1. The question paper contains three parts A, B and C.**
**2. Section A consists of 20 questions of 1 mark each. Attempt any 16 questions.**
**3. Section B consists of 20 questions of 1 mark each. Attempt any 16 questions.**
**4. Section C consists of 10 questions based on two Case Studies. Attempt any 8 questions.**
**5. There is no negative marking.**

| | **SECTION A** | |
|---|---|---|
| | **Section A consists of 20 questions. Any 16 questions are to be attempted** | |
| **Q.NO.** | | **MARKS** |
| **1** | A box contains cards numbered 6 to 50. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square like 4,9….is<br>(a) 1/45<br>(b) 2/15<br>(c) 4/45<br>(d) 1/9 | **1** |
| **2** | In a circle of diameter 42cm ,if an arc subtends an angle of 60 ˚ at the centre where ∏=22/7,then the length of the arc is<br>(a) 22/7 cm<br>(b) 11cm<br>(c) 22 cm<br>(d) 44 cm | **1** |
| **3** | If sinϴ = *x* and secϴ = *y* , then tanϴ is<br>*(a) xy*<br>*(b) x/y*<br>*(c) y/x*<br>(d) *1/xy* | **1** |
| **4** | The pair of linear equations *y* = 0 and *y* =-5 has<br>(a) One solution<br>(b) Two solutions<br>(c) Infinitely many solutions<br>(d) No solution | **1** |
| **5** | A fair die is thrown once. The probability of even composite number is<br>(a) 0<br>(b) 1/3<br>**(c)** 3/4<br>**(d) 1** | **1** |
| **6** | 8 chairs and 5 tables cost Rs.10500, while 5 chairs and 3 tables cost Rs.6450. The cost of each chair will be<br>(a) Rs. 750<br>(b) Rs.600<br>(c) Rs. 850<br>(d) Rs. 900 | **1** |
| **7** | If cosϴ+$\cos^2$ϴ =1,the value of $\sin^2$ϴ+$\sin^4$ϴ is<br>(a) -1<br>(b) 0<br>(c) 1<br>(d) 2 | **1** |

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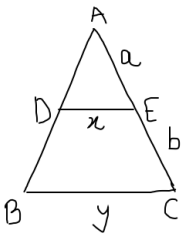
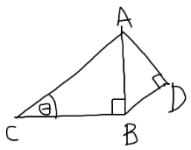
| **8** | The decimal representation of $\frac{23}{2^3 \times 5^2}$ will be<br>(a) Terminating<br>(b) Non-terminating<br>(c) Non-terminating and repeating<br>(d) Non-terminating and non-repeating | **1** |
| **9** | The LCM of $2^3X3^2$ and $2^2X3^3$ is<br>(a) $2^3$<br>(b) $3^3$<br>(c) $2^3X3^3$<br>**(d)** $2^2X3^2$ | **1** |
| **10** | The HCF of two numbers is 18 and their product is 12960. Their LCM will be<br>(a) 420<br>(b) 600<br>(c) 720<br>**(d)** 800 | **1** |
| **11** | In the given figure, DE II BC. Which of the following is true?<br>  <br><br>(a) $x = \frac{a+b}{ay}$<br>(b) $y = \frac{ax}{a+b}$<br>(c) $x = \frac{ay}{a+b}$<br>**(d)** $\frac{x}{y} = \frac{a}{b}$ | **1** |
| **12** | The co-ordinates of the point P dividing the line segment joining the points A (1,3) and B (4,6) internally in the ratio 2:1 are<br>(a) (2,4)<br>(b) (4,6)<br>(c) (4,2)<br>(d) (3,5) | **1** |
| **13** | The prime factorisation of 3825 is<br>(a) $3x5^2x21$<br>(b) $3^2x5^2x35$<br>(c) $3^2x5^2x17$<br>**(d)** $3^2x25x17$ | **1** |
| **14** | In the figure given below, AD=4cm,BD=3cm and CB=12 cm, then cotΘ equals<br>  <br><br>(a) 3/4<br>(b) 5/12<br>(c) 4/3<br>**(d)** 12/5 | **1** |

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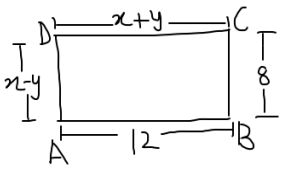
| **15** | If ABCD is a rectangle , find the values of x and y<br>  <br><br>(a) X=10,y=2<br>(b) X=12,y=8<br>(c) X=2,y=10<br>**(d)** X=20,y=0 | **1** |
| **16** | In an isosceles triangle ABC, if AC=BC and $AB^2=2AC^2$, then the measure of angle C will be<br>(a) 30˚<br>(b) 45˚<br>**(c)** 60˚<br>(d) 90˚ | **1** |
| **17** | If -1 is a zero of the polynomial $p(x)=x^2-7x-8$ , then the other zero is<br>(a) -8<br>(b) -7<br>(c) 1<br>(d) 8 | **1** |
| **18** | In a throw of a pair of dice, the probability of the same number on each die is<br>(a) 1/6<br>(b) 1/3<br>(c) 1/2<br>(d) 5/6 | **1** |
| **19** | The mid-point of (3p,4) and (-2,2q) is (2,6) . Find the value of p+q<br>(a) 5<br>(b) 6<br>(c) 7<br>(d) 8 | **1** |
| **20** | The decimal expansion of $\frac{147}{120}$ will terminate after how many places of decimals?<br>(a) 1<br>(b) 2<br>(c) 3<br>**(d)** 4 | **1** |
| | **SECTION B** | |
| | **Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted** | |
| **21** | The perimeter of a semicircular protractor whose radius is 'r' is<br>(a) $\pi + 2r$<br>(b) $\pi + r$<br>(c) $\pi r$<br>(d) $\pi r + 2r$ | **1** |
| **22** | If P (E) denotes the probability of an event E, then<br>(a) $0< P(E) \leqslant 1$<br>(b) $0 < P(E) < 1$<br>(c) $0 \leq P(E) \leq 1$<br>(d) $0 \leqslant P(E) < 1$ | **1** |

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|---|---|---|
| **23** | In ΔABC, <B=90˚ and BD ⊥ AC. If AC = 9cm and AD = 3 cm then BD is equal to<br>(a) 2√2 cm<br>(b) 3√2 cm<br>(c) 2√3 cm<br>(d) 3√3 cm | **1** |
| **24** | The pair of linear equations 3x+5y=3 and 6x+ky=8 do not have a solution if<br>(a) K=5<br>(b) K=10<br>(c) k≠10<br>**(d)** k≠5 | **1** |
| **25** | If the circumference of a circle increases from 2∏ to 4∏ then its area _____ the original area<br>(a) Half<br>(b) Double<br>(c) Three times<br>**(d)** Four times | **1** |
| **26** | Given that sinΘ=a/b ,then tanΘ is equal to<br>(a) $\frac{b}{\sqrt{a^2+b^2}}$<br>(b) $\frac{b}{\sqrt{b^2-a^2}}$<br>(c) $\frac{a}{\sqrt{a^2-b^2}}$<br>(d) $\frac{a}{\sqrt{b^2-a^2}}$ | **1** |
| **27** | If $x = 2\sin^2\Theta$ and $y = 2\cos^2\Theta+1$ then $x+y$ is<br>(a) 3<br>(b) 2<br>(c) 1<br>(d) 1/2 | **1** |
| **28** | If the difference between the circumference and the radius of a circle is 37cm ,∏=22/7, the circumference (in cm) of the circle is<br>(a) 154<br>(b) 44<br>(c) 14<br>(d) 7 | **1** |
| **29** | The least number that is divisible by all the numbers from 1 to 10 (both inclusive)<br>(a) 100<br>(b) 1000<br>(c) 2520<br>(d) 5040 | **1** |
| **30** | Three bells ring at intervals of 4, 7 and 14 minutes. All three rang at 6 AM. When will they ring together again?<br>(a) 6:07 AM<br>(b) 6:14 AM<br>(c) 6:28 AM<br>**(d)** 6:25 AM | **1** |
| **31** | What is the age of father, if the sum of the ages of a father and his son in years is 65 and twice the difference of their ages in years is 50?<br>(a) 40 years<br>(b) 45 years<br>(c) 55 years<br>(d) 65 years | **1** |
| **32** | What is the value of $(\tan\Theta\ \mathrm{cosec}\Theta)^2-(\sin\Theta\ \sec\Theta)^2$<br>(a) -1<br>(b) 0<br>(c) 1<br>(d) 2 | **1** |

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| **33** | The perimeters of two similar triangles are 26 cm and 39 cm.The ratio of their areas will be<br>(a) 2:3<br>(b) 6:9<br>(c) 4:6<br>**(d)** 4:9 | **1** |
| **34** | There are 20 vehicles-cars and motorcycles in a parking area. If there are 56 wheels together, how many cars are there?<br>(a) 8<br>**(b)** 10<br>**(c) 12**<br>**(d) 20** | **1** |
| **35** | A man goes 15m due west and then 8m due north. How far is he from the starting point?<br>(a) 7m<br>(b) 10m<br>(c) 17m<br>**(d)** 23m | **1** |
| **36** | What is the length of an altitude of an equilateral triangle of side 8cm?<br>(a) 2√3 cm<br>(b) 3√3 cm<br>(c) 4√3 cm<br>**(d)** 5√3 cm | **1** |
| **37** | If the letters of the word RAMANUJAN are put in a box and one letter is drawn at random. The probability that the letter is A is<br>(a) 3/5<br>(b) 1/2<br>(c) 3/7<br>(d) 1/3 | **1** |
| **38** | Area of a sector of a circle is 1/6 to the area of circle. Find the degree measure of its minor arc.<br>(a) 90˚<br>(b) 60˚<br>(c) 45˚<br>(d) 30˚ | **1** |
| **39** | A vertical stick 20m long casts a shadow 10m long on the ground. At the same time a tower casts a shadow 50m long. What is the height of the tower?<br>(a) 30m<br>(b) 50m<br>(c) 80m<br>(d) 100m | **1** |
| **40** | What is the solution of the pair of linear equations *37x+43y=123, 43x+37y=117*?<br>**(a)** $x = 2, y = 1$<br>**(b)** $x = -1, y = 2$<br>**(c)** $x = -2, y = 1$<br>**(d)** $x = 1, y = 2$ | **1** |

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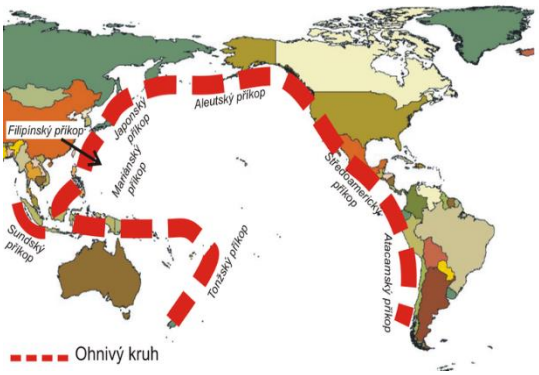
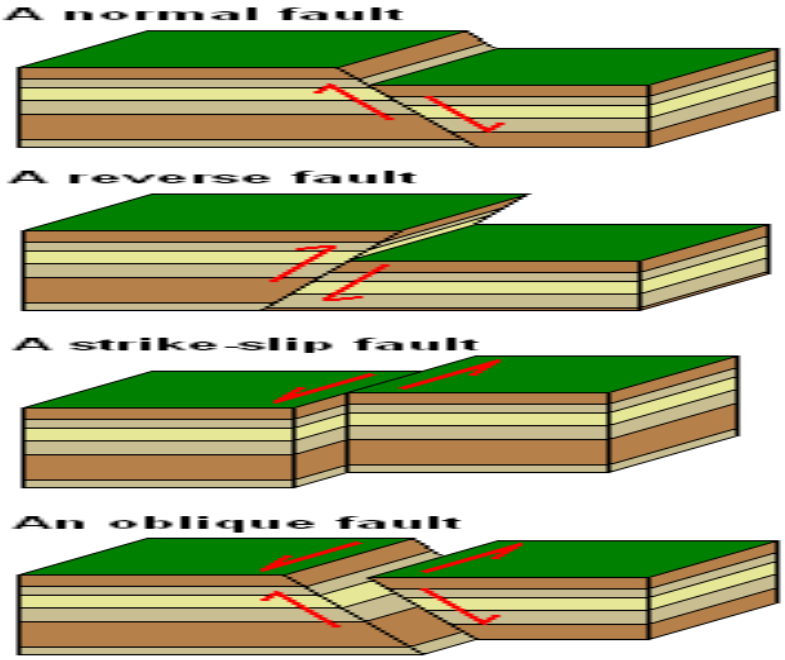
| | **SECTION C**<br>**Case study based questions** | |
| | **Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.** | |
| | **Case Study -1**<br>**Pacific Ring of Fire** | |




**The Pacific Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur. In a large horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements.**

https://commons.wikimedia.org/wiki/File:Pacifick%C3%BD_ohniv%C3%BD_kruh.png

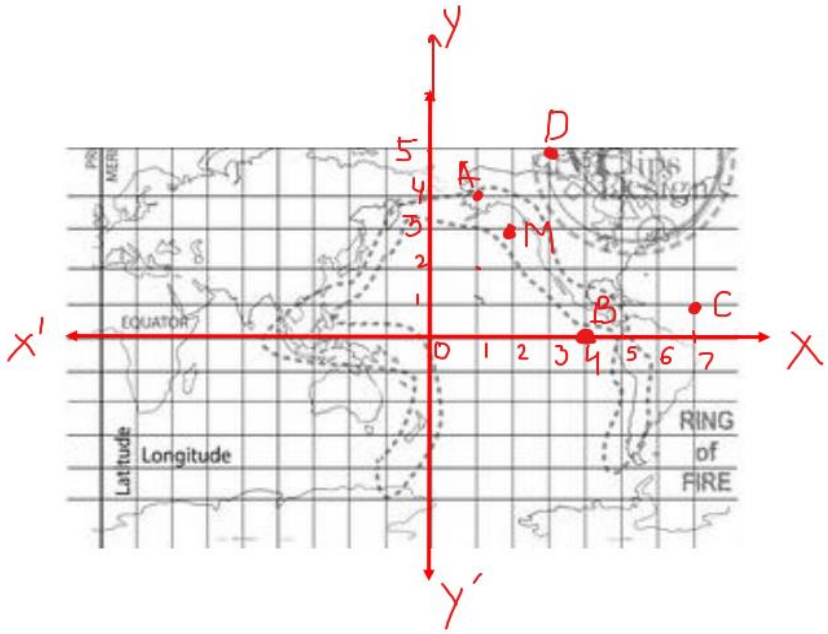
**Fault Lines**




**Large faults within the Earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Energy release associated with rapid movement on active faults is the cause of most earthquakes.**

https://commons.wikimedia.org/wiki/File:Faults6.png

**Positions of some countries in the Pacific ring of fire is shown in the square grid below.**




**Based on the given information, answer the questions NO. 41-45**

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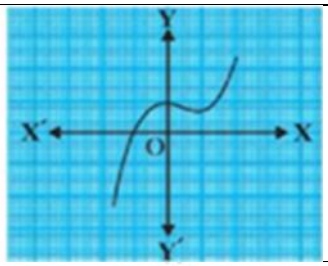
|---|---|---|
| **41** | The distance between the point Country A and Country B is<br>(a) 4 units<br>(b) 5 units<br>(c) 6 units<br>(d) 7 units | **1** |
| **42** | Find a relation between x and y such that the point *(x,y)* is equidistant from the Country C and Country D<br>*(a) x-y = 2*<br>*(b) x+y = 2*<br>*(c) 2x-y = 0*<br>*(d) 2x+y = 2* | **1** |
| **43** | The fault line 3x + y – 9 = 0 divides the line joining the Country P(1, 3) and Country Q(2, 7) internally in the ratio<br><br>(a) 3 : 4<br>(b) 3 : 2<br>(c) 2 : 3<br>(d) 4 : 3 | **1** |
| **44** | The distance of the Country M from the x-axis is<br>(a) 1 units<br>(b) 2 units<br>(c) 3 units<br>(d) 5 units | **1** |
| **45** | What are the co-ordinates of the Country lying on the mid-point of Country A and Country D?<br>(a) (1, 3)<br>(b) (2, 9/2)<br>(c) (4, 5/2)<br>(d) (9/2, 2) | **1** |
| | **Case Study -2**<br>**ROLLER COASTER POLYNOMIALS**<br><br>  <br>**Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involving them. Since, polynomials are used to describe curves of various types engineers use polynomials to graph the curves of roller coasters.**<br><br>https://images.app.goo.gl/WfcM1aRTHjjqtyT27<br><br>**Based on the given information, answer the questions NO. 46-50.** | |
| **46** | If the Roller Coaster is represented by the following graph y=p(x) , then name the type of the polynomial it traces. | **1** |

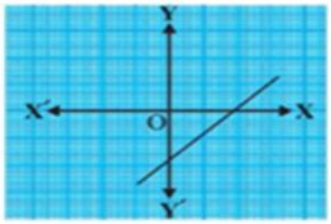
(a) Linear
(b) Quadratic
(c) Cubic
**(d)** Bi-quadratic

**47** The Roller Coasters are represented by the following graphs y=p(x). Which Roller Coaster has more than three distinct zeroes? **1**

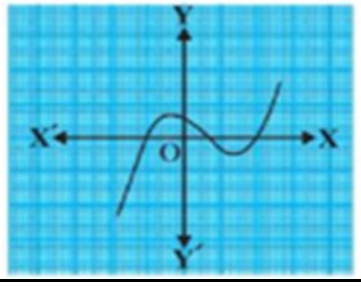
(a)




(b)




(c )



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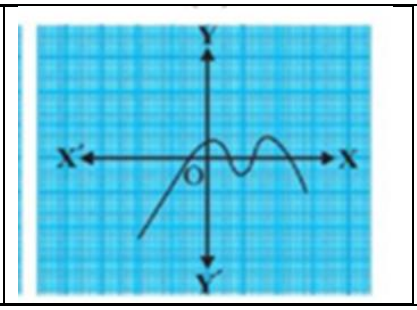
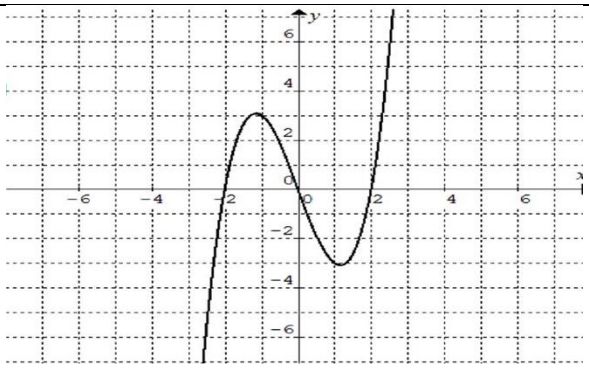
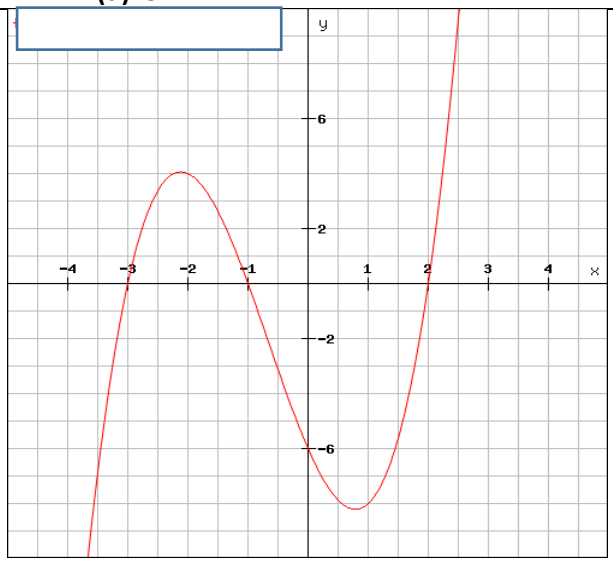
| | (d)   | |
| **48** | If the Roller Coaster is represented by the cubic polynomial $t(x)= px^3+qx^2+rx+s$ ,then which of the following is always true<br>(a) $s\neq0$<br>(b) $r\neq0$<br>(c) $q\neq0$<br>(d) $p\neq0$ | **1** |
| **49** |  <br>If the path traced by the Roller Coaster is represented by the above graph y=p(x), find the number of zeroes?<br>(a) 0<br>(b) 1<br>(c) 2<br>**(d)** 3 | **1** |
| **50** |  <br>If the path traced by the Roller Coaster is represented by the above graph y=p(x), find its zeroes?<br>(a) -3, -6, -1<br>(b) 2, -6, -1<br>(c) -3, -1, 2<br>**(d)** 3, 1, -2 | **1** |

# Marking Scheme
# Class- X Session- 2021-22
# TERM 1
# Subject- Mathematics (Basic)

| Q. N. | CORRECT OPTION | HINTS/SOLUTION |
|---|---|---|
| 1 | (d) | P(perfect Square)=5/45=1/9 |
| 2 | (c) | length of the arc= Θ /360˚ (2πr)=(60˚/360˚)x2x(22/7)x21=22cm |
| 3 | (a) | TanΘ = sinΘ/cosΘ = sinΘxsecΘ = xy |
| 4 | (d) | The lines are parallel hence No solution |
| 5 | (b) | P(even composite no) =2/6=1/3 |
| 6 | (a) | Let the cost of one chair=Rs. x<br>Let the cost of one table=Rs. y<br>8x+5y=10500<br>5x+3y=6450<br>Solving the above equations<br>Cost of each chair= x= Rs. 750 |
| 7 | (c) | $Cos\Theta=I-cos^2\Theta=sin^2\Theta$<br>Therefore $Sin^2\Theta+sin^4\Theta=cos\Theta+cos^2\Theta=1$ |
| 8 | (a) | Terminating |
| 9 | (c ) | $2^3x3^3$ |
| 10 | (c) | $1^{st}$ No. x $2^{nd}$ No. = HCF X LCM<br>12960=18 X LCM<br>LCM=720 |
| 11 | (c) | AE/AC=DE/BC=a/a+b=x/y<br>X=ay/(a+b) |
| 12 | (d) | (2x4+1x1)/3 , (2x6+1x3)/3<br>=(3,5) |
| 13 | (c) | $3825=3^2x5^2x17$ |
| 14 | (d) | $AB^2=AD^2+BD^2$<br>AB=5cm<br>$AC^2=AB^2+CB^2$<br>AC=13 cm<br>Cot $\theta$=CB/AB=12/5 |
| 15 | (a) | x+y=12<br>X-y=8<br>Solving the above equations<br>X=10,y=2 |
| 16 | (d) | $AB^2=AC^2+AC^2$<br>$=AC^2+BC^2$<br>Hence, angle C=90° |
| 17 | (d) | Let the zeroes be a and b<br>Then, a=-1 , a+b=-(-7)/1<br>Hence, b=7+1=8 |
| 18 | (a) | P(same no on each die)=6/36=1/6 |
| 19 | (b) | (2,6)=((3p-2)/2, (4+2q)/2)<br>3p-2=4, 4+2q=12<br>P=2, q = 4 hence p+q = 6 |
| 20 | (c ) | $147/120= 49/40=49/2^3x5$ |

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| | | Three decimal places |
| 21 | (d ) | Perimeter of protractor=Circumference of semi-circle + 2 x radius<br>$=\pi r+2r$ |
| 22 | (c) | $0\leq P(E)\leq 1$ |
| 23 | (b) | CD/BD=BD/AD<br>$BD^2$=CDXAD=6X3<br>BD=3√2 cm |
| 24 | (b ) | $3/6=5/k \Rightarrow K=10$ |
| 25 | (d ) | C1/C2=2πr/2πR<br>2π/4π=2πr/2πR<br>r/R=1/2<br>$A1/A2=\pi r^2/\pi R^2=(r/R)^2=(1/2)2=1/4$<br>A2=4A1 |
| 26 | (d) | $\sin\Theta=a/b$<br>$H^2=P^2+B^2$<br>$b^2=a^2+B^2$<br>$B=\sqrt{(b^2-a^2)}$<br>$\tan\Theta=P/B=a/\sqrt{(b^2-a^2)}$ |
| 27 | (a) | $x+y=2\sin^2\Theta+2\cos^2\Theta+1$<br>$=2(\sin^2\Theta+\cos^2\Theta)+1$<br>=2+1=3 |
| 28 | (b) | $2\pi r- r=37$<br>$r\{2x(22/7)-1\}=37$<br>r=37x7/37<br>r=7<br>circumference=2x(22/7)x7=44cm |
| 29 | (c) | 1 = 1<br>2 = 2 × 1<br>3 = 3 × 1<br>4 = 2 × 2<br>5 = 5 × 1<br>6 = 2 × 3<br>7 = 7 × 1<br>8 = 2 × 2 × 2<br>9 = 3 × 3<br>10 = 2 × 5<br>So, LCM of these numbers = 1 × 2 × 2 × 2 × 3 × 3 × 5 × 7 = 2520<br>Hence, least number divisible by all the numbers from 1 to 10 is 2520 |
| 30 | ( c) | LCM 0f 4,7,14=28<br>Bells will they ring together again at 6:28 AM |
| 31 | (b) | Let age of Father=x Years<br>Let age of son = y years<br>x+y = 65<br>2(x-y)=50<br>Solving the above equations<br>Father's Age =x = 45 years |
| 32 | ( c) | $(\tan\Theta\operatorname{cosec}\Theta)^2-(\sin\Theta\sec\Theta)^2$<br>$=\tan^2\Theta\operatorname{cosec}^2\Theta-\sin^2\Theta\sec^2\Theta$<br>$=(\sin^2\Theta/\cos^2\Theta)x1/\sin^2\Theta-\sin^2\Theta x1/\cos^2\Theta$<br>$=(1-\sin^2\Theta)/\cos^2\Theta=\cos^2\Theta/\cos^2\Theta$ =1 |
| 33 | ( d) | $A1/A2=(P1/P2)^2=(26/39)^2$ |

| | | |
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| | | A1/A2=$(2/3)^2$=4/9 |
| 34 | (a ) | Let no of Cars=x<br>Let no of motorcycles=y<br>X+y=20<br>4x+2y=56<br>Solving the above equations<br>No of cars=x=8 |
| 35 | ( c) | $H^2=P^2+B^2$<br>$H^2=15^2+8^2$<br>H=17m |
| 36 | ( c) | $(altitude)^2=(side)^2-(side/2)^2$<br>$=8^2-4^2$= 64-16 =48<br>Altitude=4√3 cm |
| 37 | (d) | P=3/9=1/3 |
| 38 | ( b) | $\Theta/360^\circ x\pi r^2=1/6x\ \pi r^2$<br>$\Theta=60^\circ$ |
| 39 | ( d) | Height of Vertical stick/Shadow of vertical stick=height of tower/shadow of tower<br>20/10=Height of tower/50<br>Height of tower=100 m |
| 40 | (d) | 37x+43y=123 ____(1)<br>43x+37y=117 ____(2)<br>Adding (1) and (2)<br>X+y=3 _____(3)<br>Subtracting (2) from (1)<br>-x+y=1.....(4)<br>Adding (3) and (4),<br>2y=4<br>y=2<br>⇒ x=1<br>∴ solution is x=1 and y=2 |
| 41 | ( b) | $AB=\sqrt{\{(4-1)^2+(0-4)^2\}}$<br>$=\sqrt{(3^2+4^2)}$<br>AB=5 units |
| 42 | (a) | $(x-7)^2+(y-1)^2=(x-3)^2+(y-5)^2$<br>$X^2+49-14x+y^2+1-2y=x^2+9-6x+y^2+25-10y$<br>Simplifying<br>x-y=2 |
| 43 | (a ) | 3x + y – 9 = 0<br>Let R divide the line in ratio k:1<br>R( 2k+1/k+1, 7k+3/k+1)<br>3(2k+1/k+1)+( 7k+3/k+1)-9=0<br>4k-3=0<br>K=3/4<br>3 : 4 |
| 44 | ( c) | Distance of M from X-axis=$\sqrt{(2-2)^2+(0-3)^2}=\sqrt{9}$=3units |
| 45 | (b) | ( (1+3)/2 , (4+5)/2) = (4/2, 9/2) = (2, 9/2) |
| 46 | (c) | Cubic |
| 47 | (d ) | Four Zeroes as the curve intersects the x-axis at 4 points |
| 48 | ( d) | p≠0 |
| 49 | (d) | 3 Zeroes as the curve intersects the x-axis at 3 points |
| 50 | ( c) | -3,-1,2 |